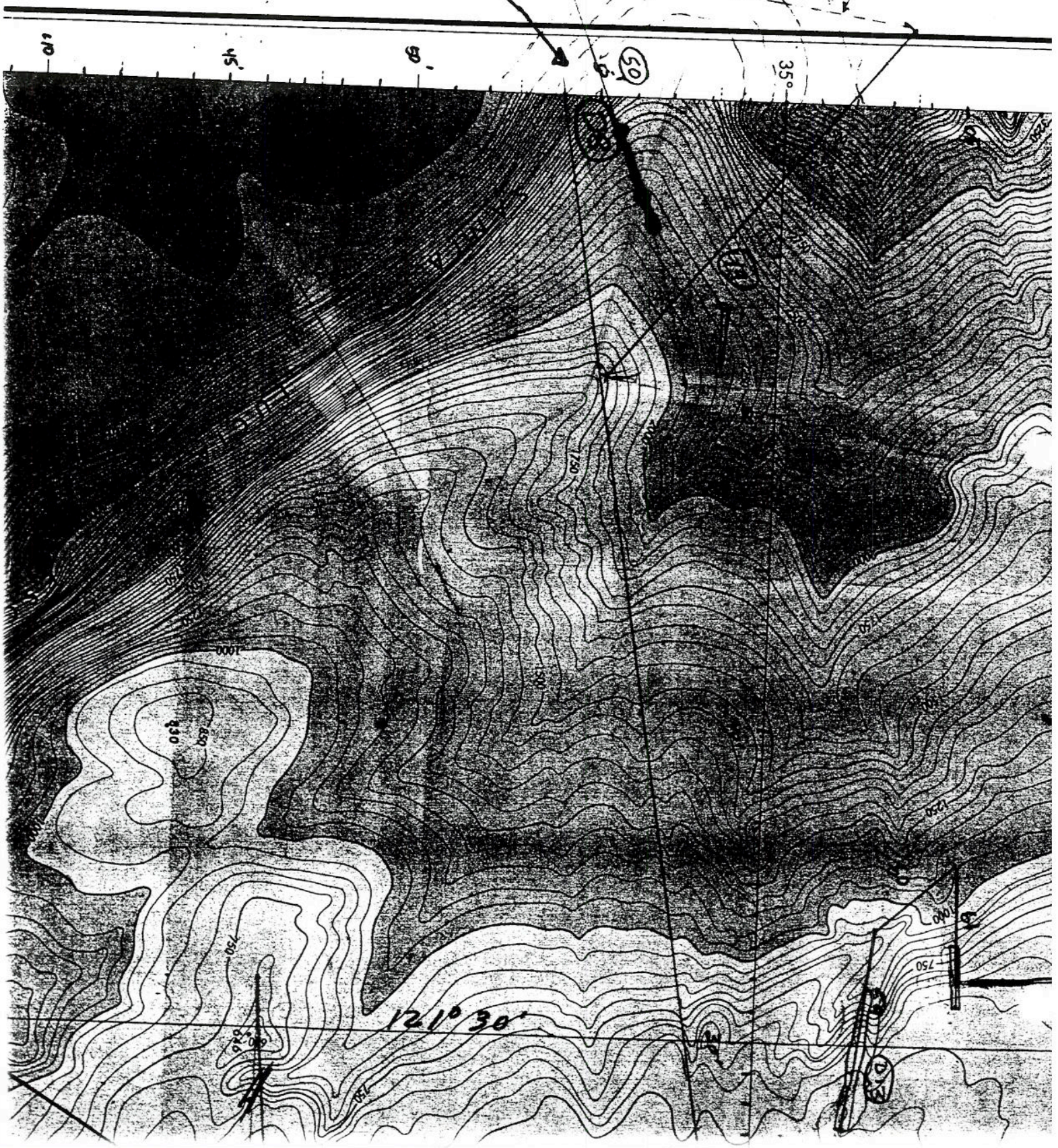
F6-87-NC
Palygorskite

#10

SCALE - 1:250,000

DREDGE D8

2600 - 2100 M



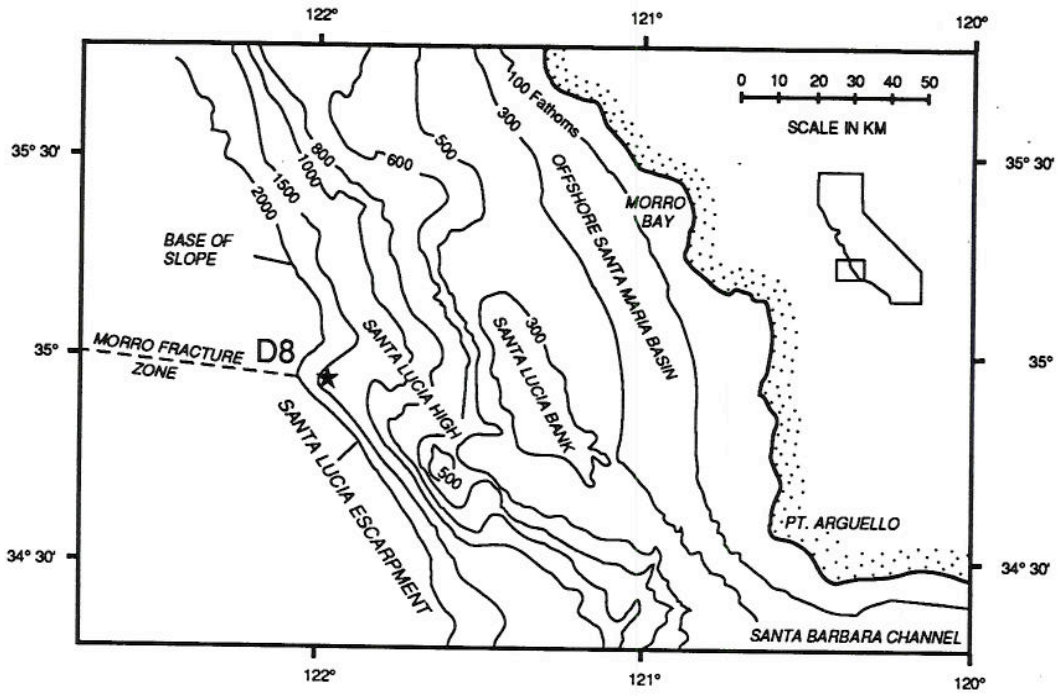


Figure 1 Gibbs et al.

anomaly at the fault to support
ement. Acoustic basement offsets
document vertical displacement.
ide of the offshore Santa Maria
d by the Hosgri fault, which is
workers to have experienced
ht-lateral slip [Graham and
; Hall et al., 1978; Silver,
rdance with this Neogene tectonic
Culloch [1987] proposed formation
Santa Maria Basin by
His mapping shows that structures
basement are en echelon, doubly
with intervening lows, consistent
ed basin development by
nching. During the Pliocene
ocene, the offshore Santa Maria
affected by a component of plate
proximately normal to the
rgin. In particular, Crouch et al.
ed seismic reflection data showing
rd verging thrust faults along the
n of the basin, and McCulloch
ed seismic profiles showing
unger compressional deformation in
d seaward parts of the basin.
some of the post-Miocene fold axes
lts across the continental margin.

Acquisition and Processing

efine deep structure and determine
ip with the shallow features across
e acquisition of RU-3 was designed
ration and crustal scale imaging,
lowing excellent resolution in the
n. The energy source consisted of
tuned, air gun array fired at 50-m
180 channel, digital streamer was
ydrophone section length of 25 m,
ce offset of 4700 m. Data were
s at a sample interval of 4 ms.
rocessing started with summation of
es in shot gathers to increase
se ratio and reduce data volume.
owed by sorting to nominal 45-fold
nt gathers and by velocity analysis
ervals. Short-period multiple and
suppression was accomplished using
convolution (32-ms gap, 200-ms
th), and water bottom-multiple
as enhanced by frequency-wave number
lied to the common midpoint gathers.
migrated after stack using a 45°
ence algorithm. The display
nsisted of me-variant, band-pass
automati n control.

Overview of Profile RU-3

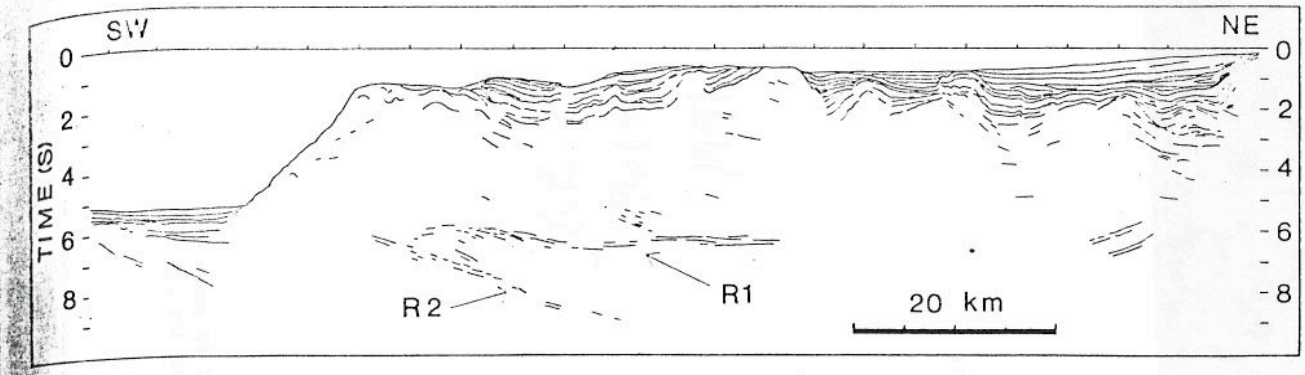


Fig. 3. Line drawing of profile RU-3 after poststack, finite difference, time migration. R1 and R2 are deep events related to the subducted oceanic plate (VE=4). Symbols same as in Figure 1.

Lucia and Santa Maria basins, (2) the abrupt upper slope break and the steep continental slope, (3) a largely nonreflective layer underlying the strata of the Neogene basins, and (4) two sets of high-amplitude, deep events (R1 and R2), beginning approximately 15 km landward of the slope base. At the southwest end of the profile, the Pacific plate is shown intersecting the continental slope. The oceanic crust of the Pacific plate is overlain by a 0.5-1.0 s thick reflection sequence and dips landward between 5.5 and 6.5 s two-way travel time. The steep (10°-18°) continental slope is a rough surface, perhaps due to small slump deposits, underlain by the nonreflective layer. Similar slope morphology continues northwest approximately 35 km (Figure 1) to the intersection with the fossil transform of Lonsdale [1991]. The Santa Lucia Basin lies landward of the upper continental slope. This basin is bounded on its seaward edge by tight folds and thrust faults and on its landward edge by the Santa Lucia Bank. RU-3 exhibits a slightly thicker stratigraphic section than the 0.75-s thickness commonly observed on seismic reflection data across other parts of the basin [McCulloch, 1987]. To the northeast of the Santa Lucia Basin, on the Santa Lucia Bank, Upper Cretaceous to Eocene rocks are exposed on the seafloor [Hoskins and Griffiths, 1971]. These units return few coherent reflections and were referred to as acoustic basement by Page et al. [1979].

The offshore Santa Maria Basin lies landward of the Santa Lucia Bank and extends to the northeast end of RU-3. In this basin, the basement structures observed on RU-3 trend northwest-southeast to form en echelon folds related to transtensional wrench faulting [McCull

the continental margin exhibits only scattered reflections. These events probably result from isolated blocks of bedded rock or faults within the presumed accretionary complex. Below this poorly reflective layer, two sets of high-amplitude events are visible on the seaward portion of RU-3. As discussed below, these events, designated R1 and R2 in Figure 3, are associated with subducted oceanic lithosphere. Other deep events occur within the basement of the Pacific plate on the seaward end of RU-3 and at 5.0-7.0 s below the offshore Santa Maria Basin.

Depth Conversion

A simplified depth section (Figure 4) shows the correct spatial relationships among the geologic features. Velocities for depth conversion were derived from analyses of refracted arrivals in the reflection data that are evident in reversed shot-receiver gather pairs. These analyses provided velocities for the upper (1-2 km) sedimentary section in the Santa Maria Basin, for the deformed rocks east of the Hosgri fault, and for the rocks below the Santa Lucia Bank. Based on these analyses, rock velocities within the offshore Santa Maria Basin increase from 1.6 km/s just below the seafloor to 4.1 km/s at approximately 2.5-3.0 s two-way travel time. In contrast, the deformed rocks east of the Hosgri fault have a compressional velocity of approximately 4.0 km/s near the seafloor. In parts of the basin with shallowly dipping strata, interval velocities derived from stacking velocity analysis compared well with the refraction-derived velocities.

A two-layer velocity model was used for dept

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Sample #	Type	Comments
	Fe Mn CRUSTS	
D8-2	BULK (0-24) Type 1	CC, XRD
D8-7A	BULK CRUST (0-20) T3	CC, XRD, REE
D8-4A	CRUST LAYER (0-16) T2 Porous-Mn cemented SS; L 1	CC, XRD
D8-4B	CRUST LAYER (16-27) T2 massive, dense; laminated-wavy L 2&3	CC, XRD
D8-4C	CRUST LAYER (27-45) T2 massive,dense; massive,porous L 4&5	CC, XRD
D8-6A	CRUST LAYER (0-5) T3 laminated	CC, PGE,AU, REE, XRD
D8-6B	CRUST LAYER (5-13) T3 laminated	CC, PGE,AU, REE, XRD
D8-6C	CRUST LAYER (13-20) T3 laminated--most dense	CC, PGE,AU, REE, XRD
D8-8C	BULK CRUST (0-23) T3+4	**CC, REE, XRD**
D8-8C	CRUST LAYER (0-6) T3+4	**XRD**
D8-8C	CRUST LAYER (6-16) T3+4	**XRD**
D8-8C	CRUST LAYER (16-23) T3+4	**XRD**
D8-9F	BULK CRUST T4	**CC, REE, XRD**
	SUBSTRATE	
D8-2B	MUDSTONE (MN FREE)	**OC, XRD**
D8-9A	MUDSTONE	**OC, REE, XRD**
D8-9B	BOXWORK BLADES	**OC, REE, XRD**
D8-9C	LT BROWN CLAY INFILLING BOXWORK	XRD
D8-9D	WAXY COHERENT SEDIMENT NEARER TO BOXWORK	XRD
D8-9E	SEDIMENT FURTHER AWAY FROM BOXWORK	XRD
D8-6D	Mn dendritic mudstone	OC, XRD
D8-7B	Mn free mudstone	OC, XRD
D8-8A	YELLOW BOXWORK	XRD
D8-8B	CREAM BOXWORK	XRD
D8-8B-1 (D8-8B(2))	BULK BOXWORK	**OC, REE, XRD**
D8-8D	MUDSTONE	**OC, REE, XRD**
~~D8-9~~	BOXWORK BLADES	XRD

T1 = Large nucleus surrounded by Mn

T2 = Mn nodules (small nucleus)

T3 = crust

T4 = crust underlain by box work

+ (2)

D8-7(1) Mudstone matr

7(2) Siltstone clast

D8-8(1) Pink Clay A

of Boxwork

D8-8(2) Light colored

pocket in M

D8-8B(1) Black boxwo

~~D8-8B(2)~~ Bulk box

D8-8D(1) Sideroxite

D8-9(1) MS in box